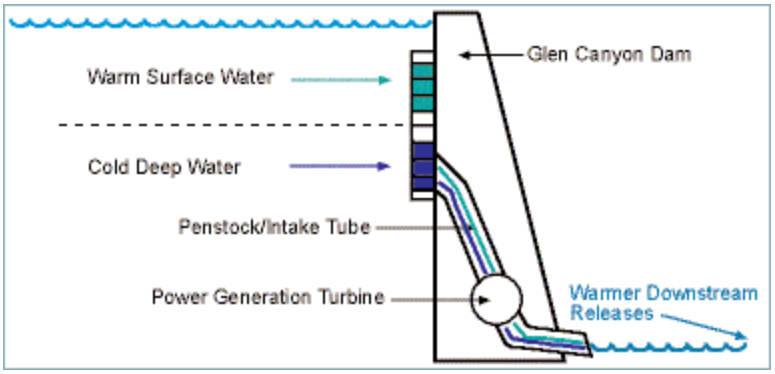
Glen Canyon Dam Temperature Control Device

Overview

Prior to completion of Glen Canyon Dam in 1963, the temperature of water flowing through the Grand Canyon each year was highly variable, ranging from the icy, spring run-off to the warm, 85-degree summer-heated flows. However, once the dam was constructed, the temperature of the water released from the dam - drawn from the depths of Lake Powell and released through the dam's large penstock intakes - ranged between 45 to 50 degrees. Immediately downstream, these cold water releases are good for the trout fishery. But as the water moves downstream through the Grand Canyon, it only warms to about 60 degrees - not warm enough to allow the endangered native fish species, the humpback chub, to adequately reproduce or to successfully compete with or evade predation by some nonnative fishes in the Colorado River.

Why a Temperature Control Device?

In 1994, the U.S. Fish and Wildlife Service (FWS) issued a biological opinion under the Endangered Species Act recommending that the Bureau of Reclamation study the feasibility of modifying the operation of the dam by adding a temperature control device to the existing dam intake structures. The temperature control device would provide operators of the dam with flexibility to draw water from different depths of the reservoir, including warmer water from near the surface of the reservoir during the summer and autumn months, which are critical for the humpback chub. The goal of the temperature control device would be to provide the right combination of cold and warm water withdrawals to benefit the humpback chub, while protecting the trout fishery at Lees Ferry and avoid enhancing or increasing the population of non-native, warm-water fish.



Helping Native Fish

Research indicates that increasing the temperature of water flowing from Glen Canyon Dam is a key element in improvement of the status of and habitat for humpback chub and other native fish in Grand Canyon. Research also suggests that increasing temperatures in the river may trigger increases of some nonnative warmwater fishes resident in Grand Canyon or stimulate parasites or disease agents that are held in check by colder water.

A temperature control device will allow dam operators to raise and lower water temperatures as appropriate to maximize the beneficial effects of warmer water and to minimize the potential negative effects. Planning for the operation of a temperature control device will include addressing future management in the event warm water releases result in unacceptable levels of competition or predation by nonnative fishes, diseases or parasites that could detrimentally affect humpback chub or other fishes of concern to the Adaptive Management Program.

Flaming Gorge Dam, upstream on the Green River in Utah, provides an example of the benefits that a temperature control device would provide Glen Canyon Dam. Since 1978, when Flaming Gorge's intake structures were modified to accommodate warm water releases, native fish have done better downstream near the Yampa River, while trout growth rates below the dam increased significantly. Temperature control devices also have been successfully installed and operated on several other Reclamation dams to benefit other fish species.

Status of the Temperature Control Device

The temperature control device is currently undergoing a feasibility assessment to satisfy provisions outlined in the FWS biological opinion. A risk assessment has been completed and the Adaptive Management Work Group (AMWG) of the Glen Canyon Dam Adaptive Management Program has recommended to the Secretary of the Interior that Reclamation move forward to complete National Environmental Policy Act (NEPA) compliance on the device. Reclamation has distributed a scoping letter on a proposal to modify two of the dam's penstocks, test them, and, with review/input of the Adaptive Management Program, determine if more modifications are necessary.

Reclamation is also developing preliminary design parameters that would be needed to maintain cold water flows to cool turbines and transformers at Glen Canyon Dam - should the device be installed - thus allowing the powerplant to continue to operate at full capacity.

Design Features and Cost

Based on late 1990s cost estimates, development and installation of temperature control devices on the penstocks at Glen Canyon Dam could cost between $40 and $100 million, depending upon the type and scale of design. A design study is currently being conducted to update these estimates.